

1 **WHAT IS CLAIMED IS:**

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3 1. A method for purification of a nitrous oxide gas comprising;
4 feeding said nitrous oxide gas and reducing agent into a de-oxidation reactor;
5 performing de-oxidation by reacting said reducing agent with oxygen using a de-
6 oxidation catalyst to form an inert, in order to deplete said oxygen in said nitrous oxide
7 gas, while limiting the amount of nitrous oxide removed from said nitrous oxide gas.

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9 2. A method according to Claim 1, wherein said reducing agent comprises a
10 hydrogen containing gas, a carbon monoxide containing gas or an ammonia containing
11 gas.

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13 3. A method according to Claim 1, wherein said reducing agent is a hydrogen
14 containing gas.

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16 4. A method according to Claim 1, wherein said inert comprises water, carbon
17 dioxide or nitrogen.

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19 5. A method according to Claim 1, wherein said inert is water.

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21 6. A method according to Claim 1, wherein said nitrous oxide gas comprises NOx,
22 nitrogen, carbon monoxide, carbon dioxide or organic compounds.

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24 7. A method according to Claim 6, wherein said NOx is removed from said nitrous
25 oxide gas by selective catalytic reduction using ammonia or a precursor thereof and a
26 selective catalytic reduction catalyst.

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28 8. A method according to Claim 7, wherein said carbon monoxide and organic
29 compounds are removed from said nitrous oxide gas during said de-oxidation.

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1 A method according to Claim 1, wherein said nitrous oxide gas comprises adipic
2 acid off-gas.

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4 10. A method according to Claim 9, wherein said off-gas comprises between 1000
5 ppmv and 10 vol. % oxygen, and between 100 ppmv and 1% NOx.

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7 11. A method according to Claim 1, wherein up to 99 vol. % of oxygen is removed
8 from said nitrous oxide gas.

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10 12. A method according to Claim 1, wherein said de-oxidation catalyst comprises
11 palladium, platinum, or mixtures thereof.

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13 13. A method according to Claim 7, wherein said selective catalytic reduction catalyst
14 comprises oxides of vanadium, titanium, or mixtures thereof.

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16 14. A method according to Claim 1, wherein said de-oxidation step is performed with
17 more than one reactor.

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19 15. A method according to Claim 7, wherein said selective catalytic reduction is
20 performed in a selective catalytic reduction reactor separate from said de-oxidation
21 reactor.

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23 16. A method according to Claim 15, wherein said selective catalytic reduction
24 reactor is a lateral flow reactor.

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26 17. A method according to Claim 7, wherein steam is used as a carrier gas for said
27 nitrous oxide gas during said selective catalytic reduction.

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1 18. A method according to Claim 7, wherein prior to and subsequent to said selective
2 catalytic reduction, an oxygen containing gas is passed over said selective catalytic
3 reduction catalyst.

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5 19. A method for purification of a nitrous oxide gas comprising;
6 feeding said nitrous oxide gas and ammonia or a precursor thereof into a reactor
7 system;
8 performing selective catalytic reduction by reacting said ammonia or precursor
9 thereof with NO_x in said nitrous oxide gas using a selective catalytic reduction catalyst;
10 feeding a reducing agent into said reactor system;
11 performing de-oxidation by reacting said reducing agent with oxygen in said
12 nitrous oxide gas using a de-oxidation catalyst.

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14 20. A method according to Claim 19, wherein nitrous oxide gas comprises NO_x,
15 nitrogen, carbon monoxide, carbon dioxide or organic compounds.

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17 21. A method according to Claim ~~19~~, wherein said reactor system comprises more
18 than one reactor.

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20 22. A method according to Claim 19, wherein said de-oxidation catalyst comprises
21 palladium, platinum or mixtures thereof.

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23 23. A method according to Claim 19, wherein said selective catalytic reduction
24 catalyst comprises oxides of vanadium, titanium, or mixture thereof.

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26 24. A method according to Claim 19, wherein said selective catalytic reduction
27 reactor is a lateral flow reactor.

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29 25. A method according to Claim 19, wherein steam is used as a carrier gas for said
30 nitrous oxide gas during said selective catalytic reduction.

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26. A method according to Claim 19, wherein prior to and subsequent to said selective catalytic reduction, an oxygen containing gas is passed over said selective catalytic reduction catalyst.

27. A method according to Claim 19, wherein recovery of nitrous oxide from said nitrous oxide gas utilizing said reactor system comprises greater than 95%.

28. A method for purification of a nitrous oxide gas comprising;
feeding said nitrous oxide gas and ammonia or a precursor thereof into a reactor system;
performing selective catalytic reduction by reacting said ammonia or precursor thereof with NOx in said nitrous oxide gas using a selective catalytic reduction catalyst; while limiting the amount of nitrous oxide removed from said nitrous oxide gas.

29. A method according to Claim 28, wherein nitrous oxide gas comprises NOx, nitrogen, carbon monoxide, carbon dioxide or organic compounds.

30. A method according to Claim 28, wherein said organic compounds are selectively removed from said nitrous oxide gas stream by said selective catalytic reduction.